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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Jebu Jacob Rajan

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EXAMINER

VO, HUYEN X

ART UNIT

PAPER NUMBER

2655

DATE MAILED: 08/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/866,595	Applicant(s) RAJAN, JEBU JACOB	
	Examiner Huyen X. Vo	Art Unit 2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 and 43-58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 and 43-58 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>6/3/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 5/16/2005 with respect to the rejection(s) of claim(s) 1-58 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Endo et al. (US 6490554) and Seide (US 5857169).

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claim 58 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

4. Claim 58 is drawn to a "program" *per se* as recited in the preamble and as such is non-statutory subject matter. See MPEP § 2106.IV.B.1.a. Data structures not claimed as embodied in computer readable media are descriptive material *per se* and are not statutory because they are not capable of causing functional change in the computer. See, e.g., *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure *per se* held nonstatutory). Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed aspects of the invention, which permit the data structure's functionality to be

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realized. In contrast, a claimed computer readable medium encoded with a data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory. Similarly, computer programs claimed as computer listings *per se*, i.e., the descriptions or expressions of the programs are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer, which permit the computer program's functionality to be realized.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 7-9, 12-14, 21, 27-29, 32-34, 43, 48-49, 51-53, and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Endo et al. (US 6490554).

7. Regarding claims 1, 21, 43, and 57, Endo et al. disclose an apparatus for detecting the presence of speech within an input audio signal, comprising: a memory for storing a predetermined function which gives, for a given set of audio signal values, a probability density for parameters of a predetermined speech model which is assumed to have generated the set of audio signal values, the probability density defining, for a given set of model parameter values, the probability that the predetermined speech model has those parameter values, given that the speech model is assumed to have generated the set of audio signal values (*col. 18, lines 10-67*); means for receiving a set of audio signal values representative of an input audio signal (*input into figure 1*); means for applying the set of received audio signal values to said stored function to give the probability density for said model parameters for the set of received audio signal values (*col. 18, lines 15-17*); means for processing said function with said set of received audio signal values applied to obtain values of said parameters that are representative of said input audio signal (*the operation of figure 10 or referring to col. 18, line 10 to col. 19, line 12*); and means for detecting the presence of speech using said obtained parameter values (*element 13 in figure 1 or col. 5, line 66 to col. 6, line 16*).

8. Regarding claims 7, 27, and 48, Endo et al. further disclose an apparatus, wherein said receiving means is operable to receive a sequence of sets of signal values representative of an input audio signal and wherein said applying means, processing means and detecting means are operable to perform their function with respect to each set of received audio signal values in order to determine whether or not each set of

received signal values corresponds to speech (*col. 18, line 1 to col. 19, line 12 or referring to the operation of figures 1 and/or 3*).

9. Regarding claims 8, 28, and 49, Endo et al. further disclose an apparatus, wherein said processing means is operable to use the values of parameters obtained during the processing of a preceding set of signal values as initial estimates for the values of the corresponding parameters of a current set of signal values being processed (*threshold values are updated in figure 6*).

10. Regarding claims 9 and 29, Endo et al. fail to specifically disclose that said sets of signal values in said sequence are non-overlapping. However, the step of partitioning of the input signal into non-overlapping frames is well known to a person of ordinary skill in the art. The advantage of doing this is to reduce processing time of input signal values.

11. Regarding claims 12, 32, and 51, Endo et al. further disclose an apparatus, wherein said processing means is operable to vary the number of parameters used to represent the speech within the audio signal values and wherein said detecting means is operable to compare the number of parameters used to represent speech within the audio signal values with a predetermined threshold value, in order to detect the presence of speech within said audio signal (*steps 4-5 in figure 9*).

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12. Regarding claims 13, 33, and 52, Endo et al. further disclose an apparatus, wherein received speech signal values are representative of a speech signal generated by a speech source as distorted by a transmission channel between the speech source and the receiving means (*microphone 41 in figure 12 inherently introduces distortions to the signal*); wherein said predetermined function includes a first part having first parameters which models said source and a second part having second parameters which models said channel (*col. 15, line 1 to col. 16, line 41, calculating noise value, signal value, and SNR value*); wherein said processing means is operable to obtain parameter values of at least said first parameters (*col. 17, lines 61-67*); and wherein said detecting means is operable to detect the presence of speech within said input audio signal from the obtained values of said first parameters (*col. 17, lines 61-67*).

13. Regarding claims 14, 34, and 53, Endo et al. further disclose an apparatus, wherein said function is in terms of a set of raw speech signal values representative of speech generated by said source before being distorted by said transmission channel, wherein the apparatus further comprises second processing means for processing the received set of signal values with initial estimates of said first and second parameters, to generate an estimate of the raw speech signal values corresponding to the received set of audio signal values and wherein said applying means is operable to apply said estimated set of raw speech signal values to said function in addition to said set of received signal values (*col. 16, line 56 to col. 17, line 67*).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 18-20, 38-40, and 54-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al. (US 6490554) in view Seide (US 5857169).

16. Regarding claims 18, 38, and 54, Endo et al. fail to disclose an apparatus further comprising means for evaluating said probability density function for the set of received audio signal values using one or more derived samples of parameter values for different numbers of parameter values, to determine respective probabilities that the predetermined speech model has those parameter values and wherein said processing means is operable to process at least some of said derived samples of parameter values and said evaluated probabilities to determine said values of said parameters that are representative of the audio speech signal.

However, Seide teaches means for evaluating said probability density function for the set of received audio signal values using one or more derived samples of parameter values for different numbers of parameter values, to determine respective probabilities that the predetermined speech model has those parameter values and wherein said processing means is operable to process at least some of said derived

samples of parameter values and said evaluated probabilities to determine said values of said parameters that are representative of the audio speech signal (*col. 8, lines 31-67, determine a recognition result for the input speech signal*).

Since Endo et al. and Seide are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Endo et al. by incorporating the teaching of Seide in order to improve speech recognition accuracy.

17. Regarding claims 19-20, 39-40, and 56-57, Endo et al. disclose a system comprising means for receiving an input signal representative of an audio signal (*input to system in figure 1*); and an apparatus according to claims 1 and 21, respectively, for detecting the presence of speech within the input signal (*see claim 1 rejection*). Endo et al. fail to specifically disclose a recognition processing means for performing a recognition processing of the portion of the input signal corresponding to speech. However, Seide teaches a recognition processing means for performing a recognition processing of the portion of the input signal corresponding to speech (*figure 1*).

Since Endo et al. and Seide are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Endo et al. by incorporating the teaching of Seide in order to perform speech recognition with high accuracy.

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18. Claims 2-6, 15, 22-26, 35, and 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al. (US 6490554) in view of Rajan et al. (IEEE Publication).

19. Regarding claims 2-6, 22-26, and 44-47, Endo et al. fail to specifically disclose a processing means comprising means for drawing samples from said probability density function and means for determining said values of said parameters that are representative of the speech from said drawn samples, wherein said drawing means is operable to draw samples iteratively from said probability density function, wherein the processing means comprises a Gibbs sampler, and wherein said processing means is operable to determine a histogram of said drawn samples and wherein said values of said parameters are determined from said histogram, and wherein said processing means is operable to determine said values of said parameters using a weighted sum of said drawn samples, and wherein the weighting is determined from said histogram.

However, Rajan et al. teach a processing means comprising means for drawing samples from said probability density function and means for determining said values of said parameters that are representative of the speech from said drawn samples (*section 3 page 250*), wherein said drawing means is operable to draw samples iteratively from said probability density function (*section 3 page 250*), wherein the processing means comprises a Gibbs sampler (*section 3 page 250*), wherein said processing means is operable to determine a histogram of said drawn samples and wherein said values of said parameters are determined from said histogram (*section 6.1 page 252*), and

wherein said processing means is operable to determine said values of said parameters using a weighted sum of said drawn samples, and wherein the weighting is determined from said histogram (*section 4.1 page 251*).

Since Endo et al. and Rajan et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Endo et al. by incorporating the teaching of Rajan et al. in order to perform speech recognition on detected speech frames.

20. Regarding claims 15 and 35, Endo et al. fail to specifically disclose an apparatus, wherein said second processing means comprises a simulation smoother. However, Rajan et al. further teach that second processing means comprises a simulation smoother (*section 4.2 page 251*).

Since Endo et al. and Rajan et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Endo et al. by incorporating the teaching of Rajan et al. in order to ensure that high frequency basis vectors do not have an excessive effect on each of the AR coefficient representations.

21. Claims 10-11, 30-31, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al. (US 6490554) in view of Bartkowiak et al. (US 5507037).

22. Regarding claims 10-11, 30-31, and 50, Endo et al. fail to specifically disclose that the speech model comprises an auto-regressive process model, wherein said parameters include auto-regressive model coefficients and wherein said detecting means is operable to compare the value of at least one of said auto-regressive model coefficients with a pre-stored threshold value. Endo et al. fail to specifically disclose that the speech model comprises an auto-regressive process model, wherein said parameters include auto-regressive model coefficients. However, Bartkowiak et al. teach that the speech model comprises an auto-regressive process model, wherein said parameters include auto-regressive model coefficients and wherein said detecting means is operable to compare the value of at least one of said auto-regressive model coefficients with a pre-stored threshold value (*col. 5, lines 30-43*).

Since Endo et al. and Bartkowiak et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Endo et al. by incorporating the teaching of Bartkowiak et al. in order ^{to} determine if the input signal is speech or noise so that appropriate action can be taken in subsequent processing to enhance signal quality.

23. Claims 16-17 and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al. (US 6490554) in view of Handel et al. (US 6324502).

24. Regarding claims 16-17 and 36-37, Endo et al. fail to disclose an apparatus, wherein said second processing means comprises a Kalman filter, and wherein said

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second part is a moving average model and wherein said second parameters comprise moving average model coefficients. However, Handel et al. teach the said second processing means comprising a Kalman filter (*Kalman Filter 34 in figure 1*), and wherein said second part is a moving average model and wherein said second parameters comprise moving average model coefficients (*col. 6, lines 1-15*).

Since Endo et al. and Handel et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Endo et al. by incorporating the teaching of Handel et al. in order to remove noise to enhance signal quality for subsequent processing.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huyen X. Vo whose telephone number is 571-272-7631. The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on 571-272-7582. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HXV

8/10/2005


SUSAN MCFADDEN
PRIMARY EXAMINER